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Reviews

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John Jenkin: *William and Lawrence Bragg, Father and Son: The Most Extraordinary Collaboration in Science*. Oxford University Press: Oxford, 2007. xiv + 444 pp. + index, illus. (B&W), ISBN: 978–0–19–923520–9 (HB), $85.

If, as Thucydides said, history is philosophy teaching by example, then biography is the primary source of both. In science, the act of discovery can sometimes best—sometimes, can only—be understood by thoroughly knowing the individual scientist. To be sure, this proposition is not uncontested. Tradition and reason hold that scientific ideas have a life of their own, independent of their makers. But where the circumstances of life inspire discovery, then the skills of the biographer demonstrably come into their own.

In this splendid book, John Jenkin shows these skills to perfection, bringing to light the lives of William and Lawrence Bragg, and illuminating their contribution to science. Equally important, he frames their work, and their relationship, within the wider history of Anglo-Australian science. The Braggs are of interest to readers of *Historical Records* not only because of what they did, but also because of what they meant—and still mean—to Australia, and to a generation of 'transplanted Britons'. Their shared award of the Nobel Prize in Physics in 1915, when both were in war service for Britain and the Empire, helped shape the image of public science throughout the English-speaking world.

Whilst several authors—notably, Gwendolen Caroe (*William Henry Bragg, 1862–1942* (CUP 1978)) and Graeme Hunter (*Light is a Messenger* (OUP 2004))—have written on father and son separately, it has fallen to Jenkin, enjoying the full cooperation of the family, to be the first to paint them on a single canvas. The task is difficult, and the structure of the book reflects the fact. Father and son, united (indeed, often confused) by name, were quite different in nature. Yet, both were deeply influential, in science and in politics, in both war and peace—William until his death in 1942, and Lawrence until his in 1972. Both were to become Directors of the Royal Institution, where both are well remembered, and elsewhere: William at the wartime Royal Society, and Lawrence at the Cavendish, during one of the most productive periods in the laboratory's history.

Jenkin explores the father–son relationship in eighteen chapters and a short epilogue. The first four chapters trace the early life of William, his upbringing in England, his education at Cambridge, his emigration to South Australia, and his struggles to foster a tradition of research in the fledgling University of Adelaide during the late 1880s. Marrying Gwendoline, the daughter of Charles and Alice Todd, William acquires a place in the social elite of Adelaide; and the following chapters trace his passage through the shoals and shallows of colonial and academic affairs. During the 1890s, his attention is captured

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by European discoveries in the domains of electricity, radio (or 'wireless telegraphy') and radioactivity, and he becomes fascinated by Röntgen's mysterious X-rays. By 1900, his reputation as a skilful experimenter reaches far beyond the small scientific community of Australia, and he begins to think of 'Home'.

Jenkin deftly explores the frustrations that eventually prompt William to remove the family to England, never to return. As often, the elder Bragg made great use of the imperial impulse in British science, such as that which brought a generation of '1851 Exhibitioners', including Ernest Rutherford, to Britain. Bragg became part of an emerging network in the rapidly advancing fields of radiochemistry and physics. It was his use of this network, and his friendship with Rutherford, as well as his research on X-rays, gamma rays and alpha particles that led to his election to the Fellowship of the Royal Society in 1907, and to the offer of a chair in physics at Leeds in 1908.

If Australia lost a lonely experimenter, England gained an adept mind, one with an eye for patterns and symmetries. In the process, young 'Willie' (and his brother, Robert, and sister Gwendolen) began a new life. In Chapter 7, 'Willie' first crosses the stage; by Chapter 12, he has completed his Australian education in Adelaide, and has followed in his father's footsteps to Cambridge. The next three chapters return to the father, and to an extended discussion of the work that took him to England. With Chapter 16 and the year 1912—William, then aged 50 and 'Willie', aged twenty-two—we see early glimmers of the ideas that would eventually bring them jointly the Nobel Prize in Physics.

Famous men are often remembered by a single word or phrase. For Charles Darwin, it is evolution; for Oscar Wilde, it is wit. For the Braggs, it is X-ray diffraction. Jenkin devotes a single but central chapter to describing how William and Lawrence, building on the work of Max Laue, showed that X-rays could be used to reveal the structure of atoms in a crystal. Refinements in theory and technique followed, consolidating their reputation, and eventually, thanks to their leadership, placing the Royal Institution and Cambridge at the forefront of the new field of X-ray crystallography.

Their Prize came in 1915, when both were at war—William served on the Admiralty's Board of Inventions and Research and worked on anti-submarine detection, while 'Willie' (or properly, Lawrence) developed sound ranging techniques for British artillery in France. Robert lost his life at Gallipoli, as did the precocious Henry Moseley, to whom William taught the 'tricks' of X-ray research. Jenkin's Chapter 17 summarizes the contributions of father and son to the 'acoustics war'—and to the future relations of science and the military in Britain (and throughout the Empire). Jenkin's narrative is superbly documented, and is sure to supersede existing secondary accounts.

For reasons that are not always clear, Jenkin weighs the balance of the book in favour of William. Perhaps it was Lawrence's fate to be overshadowed by his father. But if we are to be spared oedipal allusions, we are left speculating that it must have been difficult for the son to fashion an independent identity and scientific career. Towards the end, Jenkin dissects some of their differences, without going beyond his sources, or resisting candour. He recalls a phrase from Primo Levy, in which William's faith in science is described as 'ingenuous' (p. 426). So it may have been, but his fame encouraged a generation to enter science, and won the confidence of men in power.

By contrast, Lawrence's career begins to take off only after the main body of the book is past, and receives only a brief half-chapter in the Epilogue. Lawrence seems to have been more complicated, emotional, even artistic. He seems to have returned to

Australia only once, but perhaps, as Jenkin hints, remained more 'Australian' than his father in his directness and determination 'to go where angels fear to tread' (p. 443). Jenkin touches deftly on the tumultuous days when Lawrence follows Rutherford as Director of the Cavendish, and presides at the birth of molecular biology. Given the acrimony surrounding the discovery of the 'double helix', Lawrence's role merits further study. Until then, we may be unlikely to know fully the reasons why the Australian-born Lawrence seemingly failed, as his English-born father apparently succeeded, in winning the affection of his contemporaries.

Overall, Jenkin does not hide his admiration for both father and son, who come alive as never before. The nature of a scientific collaboration in which so much is necessarily oral, and does therefore not form part of the written record, requires a special degree of insight. This, after many years of 'living' with the Braggs, Jenkin has clearly acquired. The well-produced text reveals few errors. In just a few cases—as the author notes—owing to the vagaries of electronic transmission, some Greek letters were lost, and small but significant errors were introduced. For the record, these are as follows: 'α-ray' should be 'β-ray' (199, line 4); 'γ-rays' should be 'β-rays' and 'β-particle' 'α-particle' (308, lines 11, 13 respectively), 'γ-particle' should be 'α-particle' (p. 313), and 'Fig. 6.2' (97) should be 'Fig. 6.1'. Beyond making these corrections, one hopes that a future edition will include a full bibliography, which will be of great value to students.

As a 'bifocal' study of a remarkable, if not unique 'couple', *Father and Son* will stand the test of time as a critical addition to the literature. If anything remains to be said about this famous pair, and their pivotal role in the history of modern chemistry, biochemistry, crystallography, metallurgy and biology, John Jenkin is surely the man to say it. In the meantime, his book does great credit to the profession of the history of science in Australia.

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John Dargavel: *The Zealous Conservator: A Life of Charles Lane Poole.*
University of Western Australia Press: Crawley, 2008. illus. (B&W),
ISBN: 978 1 921401 14 5 (PB), $29.95.

Charles Lane Poole (1885–1970) was the Commonwealth of Australia's first forester: he advanced—so the back of this book states—'the frontier of forest conservation in Australia with great knowledge and relentless energy'. In a life of some controversy, his monument was the Australian Forestry School, established at Yarralumla in 1927. Before that, his career was an emblem of Empire. A Sussex-born, Dublin-raised graduate of the French National Forestry School, he was posted as a district forester to the Transvaal, then to Sierra Leone, then to Western Australia, to New Guinea and Papua. The forestry he practised was—he believed—firmly a part of colonial control. Then in Canberra, as the Commonwealth of Australia's Forestry Adviser, he argued insistently for a national policy, to be informed by the management of forests as a national and natural resource. In this deft, compassionate account, John Dargavel allows the (considerable) idiosyncrasy of the subject, the often sobering elements of his context, and a keen sense of the emergence of a profession to shape an interpretation that is explicitly heroic. 'It was this mesh of science, forestry and progress that underpinned his moral fortitude', Dargavel concludes of Lane Poole, but only after giving each of those terms a careful, critical historical assay.

A conversation between author and subject runs throughout this book, sometimes openly—'we are connected, Charles and I, through trees, as foresters should be'—but usually implicitly, as Dargavel tests

his sense of the science of forestry, and its compromises in government and policy, against the inheritance Lane Poole represents. Deep assumptions—or at least associations—inform the 'care of generations' Lane Poole sought to exercise. In Sierra Leone, where he served from 1911 to 1916, one of his maxims was: 'never touch a boy unless to flog him until he can't stand'. Travelling to Perth, he soon formed a view of Australians: 'most of the people, especially the women, were fearful cows. I can't recall one for whom I had any esteem or regard'. Ever unrepentant for his conservatism, by 1922 he observed that 'no one could live cheek-by-jowl with the working classes of Australia without realizing the futility of most of the tenets of Liberalism'.

From this perspective, Lane Poole is an unlikely hero. But behind these traits of personality—the modes of aloof restraint and prejudice that befit him as (in Dargavel's phrase) 'a proper Englishmen'—there is a deeper narrative about living the discipline of an emerging profession, and building the authority to defend it. In a public life of argument and friction, and private life of duty, disruption, and self-denial, Lane-Poole poses interesting questions of what it takes, or took, to build institutions, codes of conduct, respect and command that are perhaps easily taken for granted until they are gone.

Forestry was, Lane-Poole insisted, a science, an impersonal discipline, with exacting codes of honour as much as expertise: from the commissioned service, with a dress uniform of swords, epaulettes and braided cap, built by the French, to the Australian Forestry School, a little more relaxed but no less proud in a required dress of tweed coat and grey flannel trousers at lectures; a khaki shirt, breeches with puttees and stout boots in camp, and a dress suit for evening wear.

And forests were much more than a commercial resource: they were a trust of stewardship, to be used wisely with an eye to a future which might require of them unanticipated roles and possibilities. Lane Poole's motto for Yarralumla was 'I serve posterity'. In studying forests, however tenuous his own employment might have been, as it was in Papua and New Guinea in 1922, he was, Dargavel insists, 'much more than a forest investigator, he was extending the frontier of the world known to measurement and science'.

As Richard Holmes has noted in *The Age of Wonder*, science and biography are now making a fresh and highly productive union, not because we want to celebrate the lives of 'great men'—science as the tablets of stone brought down by sage figures—but because we need to understand the contingency, the investment of ego, the risk, the hybrid formation and uncertain trajectory of science as it is lived. Lane-Poole, in his Tory discipline and prejudice, his colonial opportunities and frustrations, his tempestuous engagement with niggardly Australian governments, his embrace of the prospects of national development and environmental fragility, provides such a figure. His marriage to Ruth Pollexfen, related to the Yeats dynasty in Ireland, who developed her own standing in Canberra as an interior designer (until frustrated in her own dealings with a stingy bureaucracy) neatly complements this account.

Defeated in his aspirations for a national forest policy, Lane Poole retired in 1945, establishing himself in Sydney as a forestry consultant. In this role the figure of distant Empire becomes remarkably contemporary: the industry adviser for hire. This move into a more familiar context of forestry and forest policy brings back Dargavel's more explicit engagement with Lane Poole's significance. Noting the many paradoxes of Lane Poole's life, Dargavel observes that, having:

> fostered a public consciousness of forests and depicted their conservation as a matter of public conscience … it was the very rise of public consciousness and the environmental

> movement's moral claims that shattered Charles' vision. The public that was to listen and learn in the 1920s and 1930s was not the public that demanded consultation and participation in the 1970s and 1980s. The foresters took tragic roles; the mentality of professional control, that had armoured them well to advance forestry, had left them clumsy and inflexible in new times …

As these extended reflections develop at the end of this book, it becomes clearer why a scholar as committed as Dargavel to a constructive, consultative and historically informed debate an Australian forestry would turn to a combative figure like Lane Poole. The latter is far from an unproblematic hero, but in this wise study Dargavel asks us to question inheritances in and preconditions for the practices of science we might take for granted.

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Carolyn Strange and Alison Bashford: *Griffith Taylor: Visionary, Environmentalist, Explorer.* National Library of Australia: Canberra, 2008. 283 pp., illus., ISBN: 978–0–64227668–1 (PB), $39.95.

With global climate change and the relationship between humanity and the natural environment being high priorities on the international agenda, it is entirely fitting that there is a new biography of Griffith Taylor (1880–1963), meteorologist, geographer and intriguing personality, who engaged with these issues in the first half of the twentieth century. Carolyn Strange and Alison Bashford have written an accomplished life history of Taylor, and one that is remarkable also for its extremely attractive book design and many engaging colour and black-and-white illustrations on every page. Both authors are historians. Strange, whose expertise lies in modern Australian, British and Canadian history, holds dual posts at the Australian National University in Canberra and at the University of Toronto. Bashford, historian of science and medicine, is based at the University of Sydney. There could not have been a better pair to tackle the complex life, times and travels of Griffith Taylor. Taylor's family emigrated from England to Australia in the 1890s. The young man studied at Cambridge, joined Captain Robert Scott's Antarctic expedition (1910–1913), joined the staff of the University of Sydney in 1920, moved on to the University of Chicago in 1929, and then to the University of Toronto (as its first Professor of Geography) in 1934. Throughout his life he travelled widely but after his retirement in 1951, he returned to settle in Australia.

Strange and Bashford present their subject through an interesting structure. They do not begin with Taylor's birth and then laboriously wend their way chronologically through his career, his academic and social context, his family life and so on, and end with his death as is the usual organization of a biography. Their introduction dives in at once to summarize the contributions, personality and positions of Taylor, thus immediately providing the reader with tools to better assess the biography that follows. At the outset we are made aware of Taylor's tremendous intellect and creative thinking, his wide-ranging expertise in geology, meteorology, anthropology and geography, his restless and rather arrogant, prickly personality, his strengths and weaknesses, and his professional, career and family circumstances. This energetic opening chapter captivates the reader at once, and the excitement and anticipation it generates will compel most readers to devour the book at a single sitting!

Most of this book is a history of science (especially Australian) and about Taylor's place in it, his ideas and his academic accomplishments. There are few diversions in these chapters about his personal life. However, having covered his professional contributions thoroughly and interestingly and placed them within his scientific milieu,

the final chapter, 'Founding Father', summarizes the personal, including his retirement and old age. This clever arrangement ensures that the focus on Taylor's innovative scientific ideas never flags, while yet providing a comprehensive interpretation of this complex and intriguing man.

Strange and Bashford write extremely well and their prose is never dull. This could not have been an easy book to write. Taylor's outstanding qualities were 'his self-aggrandisement, his pugnacious defence of his ideas, his peculiar blend of abstemiousness and exuberance' (p. 3); he 'claimed authority over many realms of knowledge' (p. 4) and 'could not resist the temptation to push and pull science over the widest possible range of historical, cultural, political, environmental and philosophical questions, even if that meant stretching his science just this side of credibility' (p. 6). He kept himself physically fit and active, travelled extensively, often walking many hundreds of kilometres on a single trip. The authors declare that their aim with this biography is to analyze scientific culture, but also to infuse it with 'the ambitions, passions, disappointments and moral choices that characterize a scientist's life' (quoting Nye, note 3, p. 234). They achieve this with great success.

It is not only Taylor's extensive engagement in many scientific, but also political and social issues that make this man a challenging biographical subject. From an early age Taylor was imbued with an overweening sense of his own importance and he was convinced that he would be a great international scientist, one whom posterity would recall with admiration. His ideas, he knew, would be worthwhile and would generate a legacy of worthwhile endeavour. And, so as to assist those who would keep his reputation alive, Taylor indulged his 'itch to write and draw' (p. 1). He maintained a minute record of every aspect of his life, keeping a daily diary, making expansive field notes, hoarding memorabilia, writing long explanatory letters to his family and colleagues, sketching and drawing and taking photographs wherever he went. He used this material to give thousands of public talks and lectures and write for the scholarly and popular press alike. In his retirement and after having received numerous honours, he drafted his autobiography using these primary sources and, as Strange and Bashford record, in 1952 he presented his publisher with a 5 kg manuscript that exceeded a thousand pages. It took his agent more than a year to read, and only after more than 160,000 words were cut from it, did it see the light of day as *Journeyman Taylor: The Education of a Scientist* in 1958. The present authors have ploughed through this remarkable private archive (now housed in the National Library of Australia, the publishers of this book) to present their thoughtful but succinct biography of Griffith Taylor and his achievements.

Taylor was integral to the transnational flow of scientific ideas in the first half of the twentieth century, an exciting period for the environmental sciences in particular. With his broad knowledge of geology, palaeontology and meteorology, Taylor did not hesitate to apply his multi-disciplinary thinking to social issues. He came to believe that geography was the lynchpin discipline, and he made his mark through his controversial view for that time that Australia should live within its climatic means. He advocated that the continent should not be overcrowded with white settlers who would be unable to sustain themselves within its specific environment. A fierce proponent of environmental determinism Taylor extended his thinking into matters of race and racial typology, and in this regard, his views coincided with other Australian scientists, such as Raymond Dart in South Africa, but, quirkily, he also advocated racial mixing, although excluding black people. Given his view that historical explanation leaned too heavily on the actions of powerful individuals, Taylor argued for environmental history

that took 'non-personal environmental factors' (p. 142) into account. But he also advocated that geography might become more than 'scientific nation planning' (p. 158). An improved understanding of human, political and physical geography was conducive to peace: 'geopacifics' he called it. Perhaps this strand of his philosophy should be taken more seriously in our own era, aptly referred to as the Age of the Anthropocene.

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Felicity Jack: *Putting Queensland on the Map: the Life of Robert Logan Jack Geologist and Explorer*. University of New South Wales Press: Sydney, 2008. ix + 275 pp., illus., maps, CD, ISBN: 9781921410260 (HB), $59.95.

About half way through this book there is a picture from the Greater Britain Exhibition in London in 1899 (p. 158). In the foreground are two obelisks reaching almost to the roof of the large factory. A very popular exhibit, these columns represented the gold produced in Queensland to 31 December 1896. On the right of the gold obelisks, if you look closely at this picture, you can see the Charters Towers goldfield exhibition. Hanging from the roof is the Union flag. Behind the obelisks is a Robert Logan Jack map. It is partially obscured, but you can make out some of the Great Artesian Basin. The picture is symbolic of Queensland: the colony cannot be considered without foregrounding the resource. The map shows the landforms and also presents the colony's important resources to the Empire-minded public.

As Robert Logan Jack put it in 1895, 'My work consists in scrambling about the mountains in advance of the prospectors and constructing a map as I go along, as this part of the country, although it has all been worked over by the Chinese, is absolutely unmapped' (p. 141). *Putting Queensland on the Map* is Felicity Jack's biography of her great-grandfather. The subtitle fittingly describes the book: *The life of Robert Logan Jack geologist and explorer*.

As a geologist Jack's most notable contribution was his involvement in promoting resources of the Great Artesian Basin. When he was surveying the proposed Transcontinental Railway linking Charleville to a proposed port in the Gulf of Carpentaria, Jack realized that there was a different drainage system to the west of the Great Dividing Range. On this trip, Robert Jack covered 555 miles in 31 days. Later the Artesian water was, as Felicity Jack quotes Dorothy Hill, Robert's 'greatest service to Queensland' (p. 71).

It is on this Cloncurry journey, and others discussed in the book, that Felicity Jack gives the reader insights into the man and the challenges of his profession. After leaving Cloncurry, Robert hired an Aboriginal boy to help on the trip. After four days the boy disappeared with one of the horses. Robert backtracked thirty-five miles to Cloncurry and found the boy. The horse was retrieved and the boy let go after a flogging. Jack's parents expressed disappointment about this flogging when they heard of it. In a letter replying to his father, Jack said: 'Take my word for it, you do not quite realize from Uncle Tom's Cabin … the conditions of savage life.' (p. 70). Felicity uses the correspondence between Robert and his father throughout to great effect. One of the most dramatic moments of the book is when Robert's father dies whilst he is in China.

Robert Logan Jack travelled extensively. His job involved constant trips prospecting and mapping, as well as major trips: the Gulf trip in the early years, the Cloncurry trip discussed above, and to London to organize the exhibit for the Greater Britain Exhibition. After twenty-three years of working for the Queensland Geological Survey, Robert quit to work for a private company in London for three times the salary. This was a sore point. Most other geologists had been given leave from the Government after such

extensive service, but Robert was forced to resign to get leave. Jack's contribution to the Queensland Geological Survey was significant: he wrote 79 reports and drew 145 geological maps. And whilst the plot of *Putting Queensland on the Map* is driven by the adventure, Felicity does not shy away from discussing the politics of working for the Government.

From this point the book becomes exciting. First, we follow the trip to China at the time of the Boxer rebellion, followed by an escape to Burma covering 874 miles in 73 days, and then the slow, sad decline of the man. It is in these chapters that the reader moves from Queensland, and Robert Logan Jack's story becomes much more than just another life of discovery and glory.

It is the title *Putting Queensland on the Map* that is completely out of place. The title sounds good but the content of the book makes it a cliché. Putting Queensland on the map well before Robert were Oxley and Flinders and the Dutch—a fact that Robert notes in his book *Northmost Australia*—and if we choose to remove our colonial goggles there were the Macassans as well. At least we should remember Robert's predecessor Richard Daintree: his maps bordered on artistry. Even if Robert did put Queensland on the map, the reader is provided no evidence of this. In 275 pages there are only two maps drawn by Robert and none of Queensland in its entirety. Having more maps would have helped the reader to follow Robert around on his numerous travels.

Then there is the complementary CD with over 600 pages of material, and only six, although delightful, maps. Sometimes it is difficult for publishers to produce maps, even Robert had this trouble in his time, but this is not a cheap paperback to be read on the bus. With such a physically large book you would expect it to be visually impressive and at a few moments with sketches from Robert's notebook it is. The illustrations, however, include thirty-five portrait photos of prominent men.

This year, 2009, Queensland celebrates its sesquicentenary of responsible government. Such events should cause governments to reflect and ask have we been responsible? Instead of simply cashing in on this celebration, writers too should be responsible: they need to ask how their narratives construct Queensland.

The sad decline of the man proves the greatest parable of this book. Robert fights for years to receive his payment from the China trip and in London his business as a geological consultant fails. When he returns to Australia after failing in London, Jack gets Gibb Maitland the Western Australia Government Geologist to circulate the rumour that his return is because of 'his love of Australia'!

It is here that we return to the photo from the Greater Britain Exhibition. Robert Logan Jack had self-interest in exploration. In the early years, through his explorations, Robert helped his stepson James acquire land outside Townsville; it is only with James' financial support that Robert can publish his book *Northmost Australia*. If this is putting Queensland on the map, then there is no map without resources and wealth. Such is life in a place defined by primary production.

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Warwick Anderson: *The Collectors of Lost Souls: Turning Kuru Scientists into Whitemen.* Johns Hopkins University Press: Baltimore, MD, 2008.
318 pp., illus. (B&W),
ISBN: 0801890403 (HB)
[Available in Australia from Footprint Books $49.95].

The Collectors of Lost Souls continues Anderson's long interest in colonialism and medicine, and in the nature of 'whiteness' in the tropics. It brings together the themes from his earlier books, *Colonial Pathologies* (about American

tropical medicine in the Philippines) and *The Cultivation of Whiteness* (about medicine and Australian tropical anxieties).

Kuru, a fatal degenerative disease manifest in the Fore people of Highland New Guinea, becomes a site of collision between Australian colonialism and the expansion of American biological science in the Cold War era. As this impressive book unfolds, it becomes clear that this is much more than a biomedical science story. Kuru exercises its own 'sorcery' on the players who come from 'primitive' and post-modern societies, from medical science, anthropology, colonial administration, and eventual biotechnology and the cultural studies of development. The span of the story is more than fifty years—and this enables an unravelling of what it means to study the disease in the very different eras of the 1940s and 1950s when the 12,000 or so Fore first met white people, through to the postcolonial 1990s and new millennium. The shifting context for the study of kuru is itself a parable of modernity and magic; as first-world and third-world societies alike come to question the absolute authority of medicine, the nature of science itself becomes more nuanced, complex and interdisciplinary. The collection of scientific material—'the collection of lost souls'—becomes increasingly more ethically problematic. As the enigmatic sub-title suggests, the process forces an engagement with a new scientific ethic that remakes the Kuru scientists themselves.

Much of the book is concerned with D. Carleton Gajdusek, an American biomedical scientist based at the National Institutes of Health in Bethesda, Maryland, who first visited the Fore in 1957, as part of a study of tropical viruses in New Guinea on his way back to the USA after a research fellowship with F. Macfarlane Burnet at the Walter and Eliza Hall Institute in Melbourne. Gajdusek was recognized by Burnet and his colleagues as a brilliant man, but 'nobody felt they could enjoy a collaboration with that person' (p. 56) as Ian R. Mackay, one of his earliest collaborators, later commented. Mackay, Lois Larkin and Gajdusek had worked with hepatitis patients at the Hall Institute to establish a general test for autoimmunity; Gajdusek was senior or sole author of the papers published in 1957 and1958. His prickly personality and absolute refusal to be constrained in his research by the niceties of scientific etiquette—or even, later, a military order, made him a difficult subject for a biographer. Gajdusek's unorthodox personal life, which eventually came to haunt him in 1997, at a time when Anderson was already researching this work, must have made it a challenge to write a biomedical biography that would do justice to the extraordinary scientific story, not unduly distracted by the sensationalism of a short prison term for a sexual offence. Anderson's inventive solution was to make the book a biography not of one or more kuru scientists, but rather of kuru itself.

Gajdusek's decision in 1957 to join the Fore and study the disease 'new to modern medicine' established what Anderson called the consistent pattern in his otherwise changing life; his name had been Carlti in childhood, became Carl, Carleton and finally in New Guinea, Kaoten, reflecting some of the shifts. What made both the man and his science was his fixation with the 'primitive', with new experience, with hard work (he slept only two to three hours per night) and with creating new family-like (obligatory) relations with Fore people (p. 58). Kuru made Gajdusek, a polymath who could have done many things, the biomedical scientist he became. The colonial setting—forged by the mandate granted to Australia to govern New Guinea by the League of Nations following World War I suggested 'unexpected possibilities for the production of scientific novelty and conjunction' (p. 88). Anderson comments:

> Medical science and the colonial state excelled at producing—sometimes

> coproducing—hybrid forms and mixed identities, at bringing people and things into fresh alignments or dissociating and recombining them. Tissue from Fore bodies bonded with reagents and dyes in the laboratory to become new things, mobilized and re-situated in another place and time frame. (p. 88)

The personality of Gajdusek dominates the book—he won a Nobel Prize for his kuru work in 1976—but the book is about kuru, not Gajdusek, and this enables Anderson to sketch many other big personalities as well, often collectively. Burnet (another Nobel Prize winner), J. Henry Bennett, Mackay, Gray Anderson and others at the Hall Institute in Melbourne in the 1950s and 1960s figure in the story alongside other biomedical scientists from elsewhere in Australia, particularly Adelaide: John Gunther, Norrie Robson and others. From the UK we meet R. A. Fisher and John Collinge, among others, and many more from the USA, particularly the younger NIH workers who followed Gajdusek to New Guinea, such as Joe Gibbs, Michael Alpers and John D. Mathews. In addition, we meet Australian anthropologists Catherine and Ronald Berndt, who worked in New Guinea in the 1940s, Reo Fortune (ex-husband of Margaret Mead), and most importantly from a point of view of anthropological sources, Australian Shirley Lindenbaum (formerly Glasse) and American Robert Glasse. Work on the ground in New Guinea was central, and personalities there included medical officers Vin Zigas (who introduced Gajdusek to the disease, and whose picture is on the front cover of the book), administrators (*kiaps*) who made science possible (or impossible), including Jack Baker and Roy Scragg, who had trained in medicine in Adelaide, was director of public health in New Guinea became mediator of some of the tensions between the Australians and the Americans. Scragg tried to enable the politically well-connected Australians to focus on genetics and demography, and to leave the better-funded and determined Americans to concentrate on neurology. Gajdusek and his team were in constant need of specimens, particularly brains from the sufferers in the kuru work, but the Adelaide team also valued these and participated in exchanges, which added to competitive scientific tensions. Fore co-workers, many of them *doctor bois* (locally-trained assistant doctors, who worked with and without qualified medical officers) are also biographically strong in this book, particularly Masasa, Puwa, Waiajeke and Inamba. Women and children who were the predominant sufferers of the disease figure less compellingly. Some of the Fore men (and their sons) helped Anderson in the writing of the book, but the insights from the women had to be gleaned from the women anthropologists, especially Shirley Lindenbaum. Lindenbaum and the Gajdusek collection also supplied most of the brilliant field photographs of kuru sufferers that illustrate the book, and provide a strong sense of the rugged environment of the Fore people.

A central feature of the book is the way Anderson figures the 'gift economy'. He shows how the Fore created obligation through their expectations in this regard. 'Fore persons and things shifted from one gift economy into another. Scientists were still operating mostly through gift giving, through the strategic and improvized exchange of materials and recognitions, forcing colleagues into social debt and requiring them to reciprocate' (p. 133). He turns the anthropological insights onto the scientists: 'for big men it is important to have large networks and manage them well' (p. 155), and gives agency and an extended history to the Fore people:

> Efforts to make Fore persons into alienated kuru things in the laboratory repeatedly failed to truncate the social and emotional ties Fore had forged, to jettison the claims that Fore made on the scientists as persons. Such relational claims were turning the scientists into new persons, composite

> persons, fashioning identities more complex than the name 'scientist' might usually imply. While scientists tried to make kuru things, Fore were generating persons, collecting white men, drawing them time and again back into their field. (p. 157)

This was 'the disease Europeans catch from kuru', as Gajdusek himself put it (p. 2).

Why is this such an important story, or more precisely, an important matrix of stories? Scientifically, the notion of a 'slow virus', of something that is 'catchable' rather than hereditary was a key discovery; the fact that kuru was a disease of Fore people suggested a hereditary or genetic cause, but the epidemiology—especially the fact that most of its sufferers were too young to have had children themselves, and that amongst adults, it affected women far more than men—belied a simple genetic explanation. It was only explained when the cultural factors were taken into account, in particular the Fore tradition of mourning through eating the dead, something only practised by women and children. The disease's etymology is also deeply historical. Cultural practice—indeed 'being Fore'—was only conceived about the time that Europeans first appeared (when several earlier tribes combined forces). The Fore people reported the fact that kuru itself had emerged only at this time. It was more or less cured by the elimination of cannibalism, but because kuru remains latent for varying times, according to the genetics of the person consuming the contaminated flesh, there were still occasional cases emerging much later. But its disappearance marked the end of an era: 'a sort of post-colonial melancholy pervaded conversations' (p. 214) by the time Anderson was undertaking his field work in 2003.

The slow virus of New Guinea was transformed in the 1980s into a pathogenic protein: a 'prion', by another colourful American, Stan Prusiner, known by the Fore as Prusli or Bruce Lee. Kuru had been anthropology, neurology, genetics and demography—but now it was biotechnology—and subject to new market forces. 'Human tissue … once created a community of scientists, now [through patents] its transaction extended the market' (p. 199), Anderson noted. Pathogenic proteins provided the mechanism for a slow virus to cross from one sufferer to another. Kuru was used as a model for understanding Creutzfeldt-Jakob disease (CJD), another infection of the brain with both genetic and environmental determinants. With the outbreak of bovine spongiform encephalopathy (BSE or mad cow's disease) in first-world Britain in 1985, and again in 1996, kuru studies received new attention. And pathogenic proteins (prions) are now also implicated in Alzheimers and maybe even AIDS. When the *Mail on Sunday* declared that the 'lessons of kuru had been learnt' in relation to BSE, Anderson commented that 'a disease of civilization … of industrial agriculture, was refigured as the return of the primitive' (p. 201).

The idea that 'we are what we eat' has a long history, and it is not limited to cannibalism, though there has long been a particular fascination reserved for this practice. The symbolism of Christian communion (whether or not the wine 'is' or 'represents' the blood of Christ) figures sacred eating and drinking as a powerful force for good. So there is particular horror in a sacred consumption that insinuates an early terrible death into a society. The eating of ancestors by Fore was sacred, and only certain people had that privilege. Cannibalism was different, and not part of Fore traditions. The idea of feeding ruminants meat or the bodies of other ruminants has been likened to cannibalism, in that negative sense. Perhaps the most disturbing thing about the BSE/CJD intersection is the idea that humans could be poisoned by beef, the 'alpha meat' associated with the best of health, not just in Britain but in many cultures. So kuru, a very local disease with a twentieth-century history, has come to shape global science and

thinking in cultures far from its origins in place and time. Warwick Anderson in *The Collectors of Lost Souls* offers his readers a profound and historically-nuanced account of kuru as a force in shaping modernity.

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Ann Moyal with Michael Organ (associate): *Koala: A Historical Biography*. CSIRO Publishing: Collingwood, 2008.
x + 246 pp., illus.,
ISBN: 9780643094017 (HB), $39.95.

Historians of science fortunate enough to live in Adelaide or Canberra will have had the chance to see a recent exhibition of the 2008 Waterhouse Natural History Art Prize. Among the carved eagles, painted frogs and leaf mandalas is a sculpture, in cleverly moulded chicken wire, by South Australian artist Paul Ballantine. It is a life-sized figure of a koala. And there is something unusual about this koala; it is walking on the ground. We tend to associate koalas with trees—has this one's tree been burned? Is it on the wallaby, looking for a new home? The title of the piece—which won first prize in the sculpture division—suggests this might be the case. It is called *Survival down to the wire*. Chicken wire is not a medium for fine detail. Rather than five individual toes on each foot, the sculptor has made feet that look like mittens. The eyes are just holes pushed into the surface of the head. None-the-less, Ballantine has captured the essence of the animal, which is exactly what Ann Moyal has tried to do in her new book *Koala: a Historical Biography*.

Koalas are naturally found throughout much of eastern Australia. There is little doubt that both their populations and range has shrunk over the last 200 years—mainly due to the destruction of their forest habitat, although disease and hunting have also played a part. Although the destruction of koalas for their fur is now a thing of the past—in 1927 over half a million koala skins were exported from Queensland alone—koalas still suffer in many parts of their range from high levels of the bacterial disease chlamydia, among the effects of which is a large drop in rates of reproduction. The effects of this disease, as well as just about every other aspect of the biology of the koala, has been much studied in recent years and Moyal gives a useful overview of much of this research. But it is the history of the interaction of humans with koalas that is really what this book is about.

The story is a fascinating one. Koalas certainly featured in the stories and legends of Aboriginal people. Moyal devotes one of her thirteen chapters to these, though she seems to have relied mostly on English transcripts of such material and as many are unattributed it is difficult to judge their value. Moyal is more sold ground when she delves into the history of the interaction.

In January 1798, John Price, one of Governor Hunter's servants, wrote in his diary 'There is another animal which the natives call a cullawine, which much resembles the sloths in America.' But this earliest written record of the koala was not published until nearly 100 years later. The first published description of 'an animal whose species was never before found in the Colony' did not come until 21 August 1803, in the Sydney Gazette. This was soon followed by a more detailed description by the naturalist Robert Brown and accurate illustrations by the artist Ferdinand Bauer.

As the nineteenth century progressed, so did knowledge of the structure and habits of this unusual marsupial. Moyal charts these in some detail, as well as painting in a historical and scientific background against which this single species can be viewed. Moyal is not a scientist, and her historical analysis is probably the stronger (an editor should have picked up the error of referring to the extinct tertiary and quaternary megafauna of Australia as 'dinosaurs', and her mention of 'flying squirrels' in the final chapter presumably refers to gliders). The later part of the book describes the koala as

an icon of Australian culture, from Norman Lindsay's 'Bunyip Bluegum' in his 1918 book *The Magic Pudding* to modern cartoonist Patrick Cook's 'sardonic and savage' cartoon koala.

The book ends with a chapter called 'Epilogue: up close and personal' in which Moyal describes the place of the koala in Australia's tourist industry and talks to some people involved in koala conservation and rescue. I found this the weakest part, mainly because its anecdotal approach is limited in scope and will date so quickly. But *Koala: a Historical Biography* will sit happily beside Moyal's 2002 book *Platypus: the Extraordinary Story of how a Curious Creature Baffled the World* as a useful overview of our relationships with the unique fauna of Australia.

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Christopher Dickman and Rosemary Woodford Ganf: *A Fragile Balance: The Extraordinary Story of Australia's Marsupials*. Thames and Hudson (Australia): Melbourne, 2007.
246 pp., illus.,
ISBN: 9780980354010 (HB), $85.

In the year 1500, Queen Isabella of Spain was shown an opossum by the explorer Pinzón, recently returned from the Americas. In re-telling the story, Chris Dickman reports that the Queen, having checked the animal's pouch with her fingers, is reputed to have described the marsupial as an 'incredible mother'. Dickman's book, with illustrations by Rosemary Woodford Ganf, is a celebration of the extraordinary animals whose females give birth to tiny young after as little as 11 days of gestation. It is a rare treat; not only a delight to read, but also a scholarly work.

Dickman sets out to give readers of all backgrounds access to scientific understanding of Australian marsupials. He notes the fine lineage of recent books on the topic for scientific audiences, notably Hugh Tyndale-Biscoe's masterful *Life of Marsupials* (2005). His own book does not repeat what can be found elsewhere for scientific audiences, but rather gives all readers a reliable and interesting overview. Throughout the text are short contributions from half a dozen scientists who write, as does Dickman himself, with gusto about their favourite subjects. One of them, Peter McRae, outlines the modern-day equivalent of Queen Isabella's reaction while describing his fascination with the bilby: 'The marvel of nature that permits a 12-day pregnancy quite understandably never ceases to amaze me but it astounds my female friends.'

A Fragile Balance is not a catalogue of species. It takes an evolutionary and ecological approach, ideal for the general reader. Dickman neatly outlines key scientific developments concerning the origin of marsupials, confirming that South America is probably the source of Australian marsupials, while noting the recent fascinating discovery of placental mammalian fossils in Australia from the Palaeocene and Late Cretaceous. He cautiously confirms the view that 'the marsupial ascendancy in Australia is more than a happy accident of biogeography', and is instead likely to be 'adaptive in an impoverished, low-nutrient environment'.

The core of the book is a summary of natural history in the context of three guilds—carnivores, omnivores and herbivores. Most of Australia's 160 or so species are mentioned throughout this 100-page account. A further section covers what Dickman describes as 'cultural history', that is the evolving attitudes of humans to the marsupials with which they share the continent. This leads inevitably to the challenge of conservation. Here the 'fragile balance' of the book's title becomes starkly relevant because, sadly, many species are extinct or rare and many more continue to decline. Chris Dickman laments our sorry history with considerable passion throughout this

section. Finally, the book is completed with a comprehensive set of thumbnail descriptions of all Australian species, compiled by Adele Haythornthwaite.

Rosemary Woodford Ganf's talents have previously been evident in the three volumes of *Marsupials of Australia* (1980, 1987 and 2005). Ganf's illustrations, mostly in full colour, but sometimes in sepia tones, show such extraordinarily fine detail that the individual hairs of the animals' coats seem to emerge life-like from the page. Further, each animal is depicted with a fragment of habitat that is also beautifully and accurately painted.

The illustrations are simply a delight. My test of accuracy is to examine the species that I happen to know well. It is my unbiased belief, for example, that some members of the family Dasyuridae are the prettiest animals on the face of the earth. Ganf captures their delicacy, their alertness, their feistiness. Many of the desert-dwelling species possess a coat of dense, fine hair as much as a centimetre thick in places, a portable insulation rug to maintain body-heat on clear winter nights. When the animal pauses in a stationary position, often this dense thick fur parts along its flanks, giving an appearance of a series of cracks and blocks. Ganf's illustrations capture such an inconspicuous essence beautifully. The fidelity of her representations adds magic to Dickman's engaging text.

Book reviewers seem often obliged to complain about the cost of a volume, but on this occasion I believe that the publisher deserves a bouquet. The book is superbly produced, mercifully free of typographical errors, and a pleasure to hold and to read. For such benefits, it is cheap indeed.

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Exhibitions

National Museum of Australia (Curator: Michael Pickering):
Charles Darwin: An Australian Selection.
National Museum of Australia Press: Canberra, 2008. 144 pp., illus.,
ISBN: 978 1 87694 472 8 (PB), $29.95.

Accompanying the exhibition ***Darwin*** *(American Natural History Museum: Curator Niles Eldridge) and National Museum of Australia (Curator: Michael Pickering), showing National Museum of Australia 10 December 2008–29 March 2009.*

In this bi-centenary year of Darwin's birth and sesqui-centenary of the publication of the *Origin of Species*, we have witnessed a veritable tsunami of new publications to the great man and his towering achievement. Many of these will fade quickly from memory, being mere rehashes of material already well known. Some, however, will remain as useful contributions to the Darwin industry. This small but brilliantly produced volume will be amongst the latter.

This is not a volume that will cause Darwin scholars to take stock of their opinions or radically overhaul their teaching or research programs. It is, nonetheless, important. It provides the general reader with a fascinating series of insights into Darwin's work from an Australian perspective. Much thought has gone onto the production values behind this book; its many well-chosen illustrations are (despite their relatively small size) breathtaking in their quality.

We are first given a good dose of primary source material from Darwin's own *Beagle* writings and it is a mark of genius that the planners of this book have chosen not to rely on the 'published Darwin', but instead have gone to the original source, his diary itself, corrections and all, cleverly transcribed by Kees Rookmaaker to include all Darwin's marginalia and corrections in the running text. The effect is an account of Darwin's period in Australia that has a freshness and immediacy that is lost in the published account. Here we can see the young Darwin polishing both his art and his science to set down his experiences

as accurately as possible. It has long been known that Darwin was, at best, ambivalent about his time in Australia, something that has been attributed to his desire to be back in England after a voyage that had lasted far longer than he had anticipated. This excuse won't really do, his diary shows. While he found much of it 'wanting' in beauty in the natural productions of the continent, he also found them fascinatingly different from the European fauna and flora he longed to see again. It was in large measure the shallowness of the social and cultural life, its rank materialism and—dare one add—its lack of strong class distinctions that turned him off.

Tom Frame's essay begins with a brief but insightful account of Darwin's life and the *Beagle* voyage until the ship's arrival in Australia. Frame then discusses Darwin's sojourn in Australia, particularly his failure to appreciate fully the uniqueness of the flora and fauna in his brief seven-week stay. Darwin's account becomes a starting point for discussing Australian responses to Darwin's somewhat negative observations; how the naturalist Arthur Lucas, himself a Darwinian in outlook and approach, complained that the great scientist had written an account so negative as to detract from any possibility that young biologists would see the golden opportunities that a largely unknown land filled with unique natural curiosities might have offered. Lucas was of course wrong. Many scientists of both Darwinian and non-Darwinian persuasions lived in or visited Australia and produced important works of natural history. There were few institutions capable of supporting biological research before the end of the nineteenth century anywhere in the world, to put Lucas's claim in another context.

In terms of the Australian response to Darwin's evolutionary ideas, Frame points out that after initial hostility there was a fairly rapid acceptance of the broad outlines of evolutionary theory. Australians such as Robert Fitzgerald, whose work on Australian Orchids was undertaken within a Darwinian paradigm (and remains a classic), provided important information to Darwin as he continued to change attitudes to the natural world from his country house in Kent.

Darwin and Darwinism have provided a mine for novelists and poets; from Jack London to A. S. Byatt, Roger Macdonald and Nicholas Drayson. The latter has contributed a short essay to this volume looking at the manner in which Darwin's musings on the peculiarities of the Australian Platypus and ant-lion led him to call into question the entire fabric of any biological paradigm based on teleological, 'natural theological' assumptions. Drayson also gives a short account of the relationship between Darwin and Alfred Russel Wallace, showing the deep differences between them in their understanding of the role of purpose in evolution. Wallace, a self taught genius embraced spiritualism, phrenology and socialism and at the end of his long life came to believe that the human mind was the pre-ordained outcome of evolution. It was a view that Darwin could never accept once natural selection came to dominate his intellectual and scientific life.

In the final essay, Robyn Williams takes us on a breezy tour of Darwin's place in our own times, from the writings of two very different great-great-grandsons of Darwin to the cultural phenomenon of creationism. Williams is as bombastic as his 'çhum' Richard Dawkins, but one cannot escape the enthusiasm for science and Darwin in particular that drives his work and life. It is a fine way to conclude this book, which I recommend as a primer for those wishing to know something more about Darwin and his Australian connections, and to those who already know about these, but enjoy being reminded about them from time to time.

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Charles Darwin Celebrations in Tasmania: Three Exhibitions

Darwin in Hobart Town, **Tasmanian Museum and Art Gallery (TMAG), Hobart (curated by Jo Eberhard)**; *Noticing Nature*, **Queen Victoria Museum and Art Gallery (QVMAG) in Launceston (curated by Tammy Gordon)**; *Charles Darwin: 1809–2009*, **University of Tasmania (Morris Miller Library foyer) (curated by Gill Ward and Professor Michael Roe)**.

The 200th anniversary of the birth of Charles Darwin has been marked in Tasmania with three exhibitions, all of them running in February 2009.

Darwin in Hobart Town and *Noticing Nature* are both small case displays, each concentrating primarily on Darwin's twelve days in Tasmania during 1836. During this time, the young and relatively inexperienced ship's naturalist explored the surrounding environment making observations in his diary. Though no objects directly related to Darwin's visit exist in either museum's collection, each display is inspired by Darwin's natural history observations and well illustrated through specimens from local collections.

Darwin in Hobart Town consists of two nineteenth century cases, with six shelves apiece. Each shelf corresponds to a day in Darwin's diary and his 1836 observations of Hobart Town and surrounds. Specimens from the museum's zoology and geology collections show what Darwin collected during his stay. Interpretive panels include extracts from the diaries and images from the TMAG art collection that show Hobart Town and the surrounding areas in the 1830s. An associated case contains a ship's chronometer, a sextant and a theodolite of the types used during the *Beagle*'s voyage.

Noticing Nature is a single case display. Darwin spent his 27th birthday in Tasmania, and the display was launched with a media event marking the 200th anniversary of his birth. As well as concentrating on Darwin's diary with specimens from the QVMAG's own zoology and geology collections, an associated banner invites the view to reflect on Darwin's legacy. Titled *Celebrating Evolution*, it explains eloquently what evolution is and poses the question—Why should I care? This excellent and clearly written panel helps the viewer to understand why scientists place such importance on Darwin and the legacy of his work.

Charles Darwin: 1809–2009 also concentrates on Darwin's time in Tasmania, but uses the splendid historical resources of the libraries of the University and the Royal Society of Tasmania to display historical books that suggest some of the ideas that came before Darwin and influenced his thinking. Publications such as Lyell's *Principles of Geology*, a copy of which was carried on board the *Beagle*, was known to have had a major influence on the young Charles Darwin. Lyell's interpretation of geological change recognized that a steady accumulation of small changes over a considerable time resulted in what we see today. Also on display is a first edition copy of *Zoönomia or the Laws of Organic Life* written by Charles' grandfather, Erasmus Darwin, in 1794.

Although all three exhibitions detail Darwin's activities in Tasmania, each offers a different perspective on his time there. From the influence of other scientists on Darwin, the practicalities of navigation for a long voyage in the 1800s to the importance of evolutionary theory, the three exhibitions are a fitting way to mark the 200th anniversary of Darwin's birth, the 173rd anniversary of his visit to Hobart and the 150th anniversary of the publication of *On the Origin of Species*.

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